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Process for Production of Gelatinized Nitrocellulose

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The invention concerns a process for production of gelatinized nitrocellulose.

As is known, nitrocellulose for technical purposes is put on the market, among others, in the form of gelatinized sheets containing a softening agent, so-called nitrocellulose chips. Different processes have become known for the production of these nitrocellulose chips. According to one of these proposals, nitrocellulose is dissolved into solvents containing a softening agent and the solution is precipitated in water, whereby solid balls precipitate in the water. Also already proposed is the feeding of the water-dampened nitrocellulose into the aqueous solution or emulsion of a solvent and a softening agent, and then the heating up of the mixture to the boiling point of the solvent until the solvents have been slowly distilled off. After cooling off, the nitrocellulose is separated off through centrifugal means and dried at a low temperature.

According to another process the fibrous nitrocellulose is again combined with a aqueous emulsion of a softening agent that possesses an active solvent power for nitrocellulose. The softening-agent-containing nitrocellulose is separated off from the water through centrifugal means and subsequently the softening-agent-containing nitrocellulose is rolled on roller frames and then dried.

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Further known is the method of producing nitrocellulose chips by pouring the nitrocellulose into a kneader with the calculated amount of softening agent and then kneading these together, whereby a gelatinized mass comes about. The gelatinized mass is rolled and dried in known ways.

All of the processes described require a relatively large amount of energy, are complicated, and lead sometimes to products that are not thoroughly gelatinized, the ungelatinized parts leading to the formation, in the subsequent rolling and drying processes, of undesired and dangerous nitrocellulose powder.

The aim of the invention is the production of an especially homogeneous and uniformly gelatinized nitrocellulose product in a simple and economical manner, which is achieved by the fact that the water-dampened, fluffy nitrocellulose, as it normally exists as an intermediate product after the separating off of the water from the nitrocellulose suspension, is loosened up in a mixer that acts in a non-compressing manner, is sprayed or jet-blown with the predetermined amount of the softening agent, and subsequently the sprayed product is compressed in known ways on roller frames and then dried.

It is advantageous to spray the softening agent in the finest possible droplets. Understood here as softening agents should be the known softening agents for nitrocellulose, as, for example, phthalic acid ester, triorthocresylphosphate (T.O.C.P.), citric acid ester.

Preferably, the dwell time in the mixture amounts to only a few minutes, so that the energy consumption is substantially lower than with the use, for example, of a kneader. The spraying with softening agent can take place at room temperature; only in the case of highly viscous types can it be advantageous to raise the temperature slightly. The good blending of softening agent and nitrocellulose brought about by the spraying leads moreover to a reduction of the rolling and drying times, so that even in these subsequent processes energy and labor costs are saved.

A further advantage of the new process is to be seen in the fact that already right after the spraying of the softening agent, the originally fiber-formed nitrocellulose is converted into a pourable, softening-agent-containing granulate that can be stored and measured out well and thus is susceptible to an automatic processing.

Example 1

62.55 kg of water-dampened, low-viscosity nitrocellulose (type E 330) (= 45 kg nitrocellulose abs. dry) with a water content of 28.1% were loosely filled into a horizontal, cylindrical mixer of 300 l nominal volume and equipped with a rapidly operating mixing

mechanism, a specially designed chopper, and an atomizing device, so that the fill degree of the mixer amounted to approximately 85% of the nominal volume. With the stirring mechanism and specially designed chopper running, 9 kg of dibutylphthalate were added by means of the spraying device over the course of 5 minutes at room temperature. During this time the nitrocellulose lost its fibrous structure; it was transformed into a pourable granulate that, with the stirring mechanism running, flowed out of the opened bottom shutter of the mixer within a few seconds.

Example 2

48.1 kg of water-dampened, medium-viscosity nitrocellulose (type E 510) (= 35 kg nitrocellulose abs. dry) with a water content of 27.2% was sprayed with 7.7 kg of dibutylphthalate at 20° C in 15 minutes in the mixer described in Example 1. The fill level of the mixer decreased from 85 to 45%.

The nitrocellulose changed from the fibrous into the granulate structure.

Example 3

A mixer as described in Example 1, but provided with an additional double jacket, was steam-heated to 100° C. 20.3 kg of water-dampened, high-viscosity nitrocellulose (type E 950) (= 15 kg nitrocellulose abs. dry) with a water content of 26.3% were filled in. In the course of 20 minutes 3.61 [kg] of dibutylphthalate were sprayed in via the atomizing device. Subsequently, stirring continued for 1 minute. The fill level of the mixer fell back from 60 to 35%. The previously fibrous nitrocellulose took on the form of small, very hard balls of 1 to 2 mm diameter. The product was pourable. The temperature of the product after the end of the mixing period was 65° C.

Patent Claim:

Process for production of gelatinized nitrocellulose through treatment of water-dampened nitrocellulose with a softening agent in the absence of solvents, characterized by the fact that the water-dampened nitrocellulose is sprayed, with a simultaneous mechanical loosening up, with the predetermined amount of softening agent in a mixer that acts in a non-compressing manner, and subsequently is compressed and dried on roller frames in known ways.